



KRAMER ELECTRONICS LTD.

# USER MANUAL

MODEL:

**VS-401 USB**  
4x1 USB Switcher

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P/N: 2900-300029 Rev 1



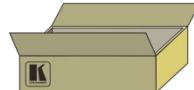
## VS-401USB Quick Start Guide

This guide helps you install and use your product for the first time. For more detailed information, go to [http://www.kramerelectronics.com/support/product\\_downloads.asp](http://www.kramerelectronics.com/support/product_downloads.asp) to download the latest manual or scan the QR code on the left.

### Step 1: Check what's in the box

- VS-401USB 4x1 USB Switcher
- 1 Power supply (5V DC)
- 1 USB cable

- 4 Rubber feet
- 1 Quick Start Guide



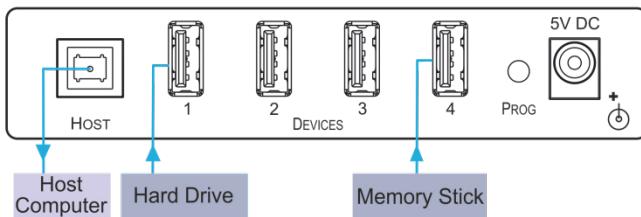
Save the original box and packaging materials in case you need to return your product for service.

### Step 2: Install the VS-401USB

Attach the rubber feet and place on a table or mount the machine in a rack (using an optional **RK-3T** rack mount).

### Step 3: Connect inputs and outputs

Always switch OFF the power on each device before connecting it to your VS-401USB.

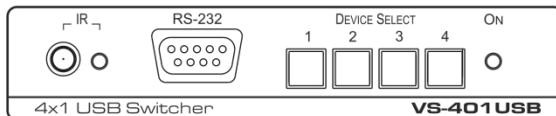


### Step 4: Connect the power

Connect the power adapters to the VS-401USB and plug the adapter into the mains electricity.

### Step 5: Operate the VS-401USB

Press a DEVICE SELECT button to switch a device to the output.



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# 1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Our 1,000-plus different models now appear in 11 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Routers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters and GROUP 11: Sierra Video Products.

Congratulations on purchasing your **Kramer VS-401USB 4x1 USB Switcher**, which is ideal for the following typical applications:

- Projection systems in conference rooms, boardrooms, auditoriums, hotels and churches, production studios, rental and staging
- Any application where high quality conversion and switching of multiple and different video signals to graphical data signals is required for projection purposes

## 2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use only the power cord that is supplied with this machine



Go to <http://www.kramerelectronics.com> to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

### 2.1 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Do not secure the cables in tight bundles or roll the slack into tight coils
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality
- Position your Kramer **VS-401USB** away from moisture, excessive sunlight and dust



This equipment is to be used only inside a building. It may only be connected to other equipment that is installed inside a building.



**Caution:** There are no operator serviceable parts inside the unit

**Warning:** Use only the Kramer Electronics input power wall adapter that is provided with the unit

**Warning:** Disconnect the power and unplug the unit from the wall before installing

## 2.2 Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at <http://www.kramerelectronics.com/support/recycling/>.

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## 3 Overview

The Kramer **VS-401USB** is a high quality 4x1 USB switcher. It accepts up to four USB devices and switches the selected device to the host. The **VS-401USB** always powers the selected port as well as the three that were not selected, (allowing attached USB units to be charged, for example).

In particular, the **VS-401USB** features:

- Four DEVICE SELECT buttons
- Hi speed USB revision 2.0
- Firmware upgrade via RS-232
- Remote control via RS-232 port and/or **RC-IR3** IR remote control transmitter
- An external 5V DC source, making it suitable for field operation

## 4 Defining the VS-401USB 4x1 USB Switcher

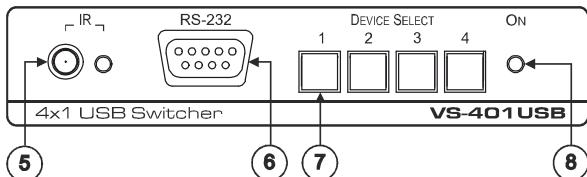
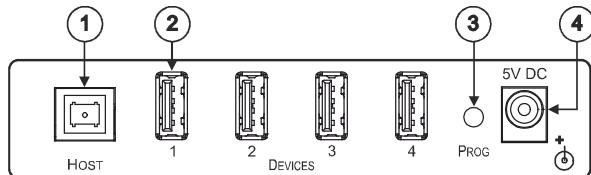


Figure 1: VS-401USB 4x1 USB Switcher

#	Feature	Function
1	HOST USB (type B) Port	Connects to the host
2	DEVICE USB (type A) port	Connects to a USB device (from 1 to 4)
3	PROG Button	Push in for "Program" using a small screwdriver to upgrade to the latest Kramer firmware via RS-232, or release for "Normal" (the factory default)
4	5V DC	+5V DC connector for powering the unit
5	IR Receiver	The yellow LED lights when receiving signals from the infrared remote control transmitter
6	RS-232 9-pin D-sub Connector	Connects to a PC for firmware upgrade and control
7	DEVICE SELECT Buttons	Select a device to switch to the host (from 1 to 4)
8	ON LED	Illuminates green when receiving power

## 5 Connecting the VS-401USB



Always switch off the power to each device before connecting it to your **VS-401USB**. After connecting your **VS-401USB**, connect its power and then switch on the power to each device.

To connect the **VS-401USB** as illustrated in the example in [Figure 2](#):

1. Connect the USB devices (for example, hard drives and/or memory sticks) to the DEVICE ports. For example, a:
  - Hard drive to port 1
  - Memory stick to port 2
  - Smart phone to port 3
  - Memory stick to port 4
2. Connect the HOST USB port to an acceptor (for example, an LCD display with a USB port).
3. If required, you can connect a PC and/or controller to the RS-232 terminal block (see [Section 5.1](#)).



For best results we recommend that you use high quality USB cables

4. Connect the 5V DC power adapter to the power socket and connect the adapter to the mains electricity (not shown in [Figure 2](#)).

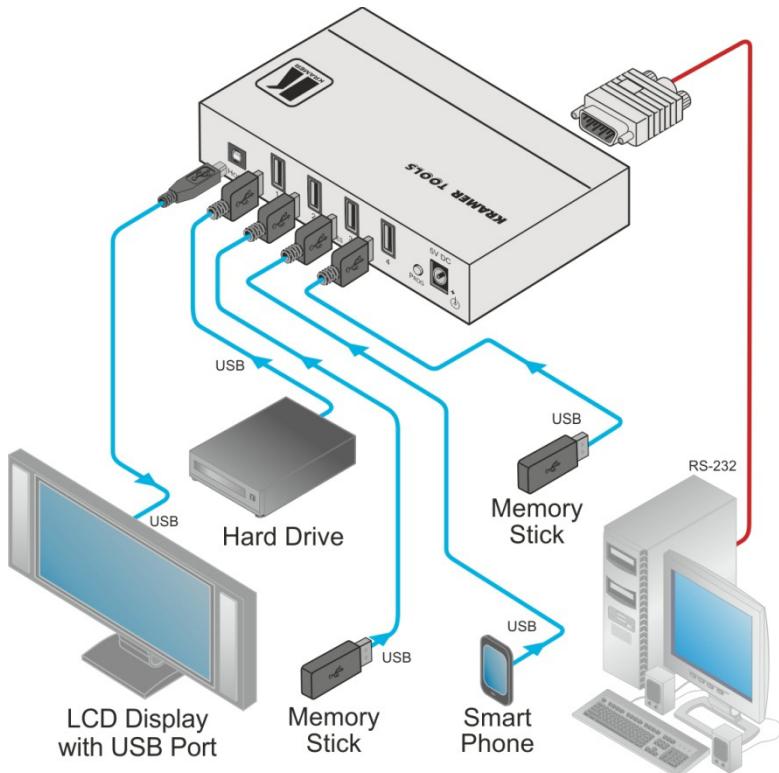


Figure 2: Connecting to the VS-401USB

## 5.1 Connecting a PC

You can connect to the **VS-401USB** via an RS-232 connection using, for example, a PC. Note that a null-modem adapter/connection is not required.

To connect to the **VS-401USB** via RS-232, connect the RS-232 9-pin D-sub rear panel port on the **VS-401USB** unit via a 9-wire straight cable (only pin 2 to pin 2, pin 3 to pin 3, and pin 5 to pin 5 need to be connected) to the RS-232 9-pin D-sub port on your PC.

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## 6 Operating the VS-401USB

You can operate the **VS-401USB** via the front panel buttons by pressing one of the four DEVICE SELECT buttons to select a device to switch to the HOST. You can also use the application software (see [Section 6.1](#)) or the **RC-IR3** IR remote control transmitter to operate the **VS-401USB**.

### 6.1 The Application Software

Use the K-SINGLE control application software to control the **VS-401USB** via the Ethernet or RS-232 9-pin D-sub.



The latest version of K-SINGLE and installation instructions can be downloaded from the Kramer Web site at [www.kramerelectronics.com](http://www.kramerelectronics.com)

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## 7 Firmware Upgrade

You can upgrade the **VS-401USB** via the Kramer K-UPLOAD software.



The latest version of K-UPLOAD and installation instructions, as well as the application software and its user guide, can be downloaded from the Kramer Web site at [www.kramerelectronics.com](http://www.kramerelectronics.com)

## 8 Technical Specifications

DEVICE PORTS:	4 x USB (type A) ports
HOST PORT:	1 USB (type B) port
CONTROL:	Front panel buttons, IR remote control, RS-232 on a 9-pin D-sub connector
POWER SOURCE:	5V DC, 3.2A
OPERATING TEMPERATURE:	0° to +40°C (32° to 104°F)
STORAGE TEMPERATURE:	-40° to +70°C (-49° to 158°F)
HUMIDITY:	10% to 90%, RHL non-condensing
DIMENSIONS:	12cm x 7.15cm x 2.44cm (4.7" x 2.81" 0.96") W, D, H
WEIGHT:	0.3kg (0.67lbs) approx.
ACCESSORIES:	Power supply, bracket installation kit
OPTIONS:	Rack adapters: RK-3T, RK-6T or RK-9T
Specifications are subject to change without notice at <a href="http://www.kramerelectronics.com">http://www.kramerelectronics.com</a>	

## 9 Default Communication Parameters

### RS-232

Protocol 2000		Protocol 3000 (Default)	
Baud Rate:	9600	Baud Rate:	115200
Data Bits:	8	Data Bits:	8
Stop Bits:	1	Stop Bits:	1
Parity:	None	Parity:	None
Command Format:	HEX	Command Format:	ASCII
Example (Output 1 to Input 1):	0x01, 0x81, 0x81, 0x81	Example (Output 1 to Input 1):	#AV 1>1<CR>

### Switching Protocol

P2000 -> P3000		P3000 -> P2000	
Command:	0x38, 0x80, 0x83, 0x81	Command:	#P2000<CR>
Front Panel:	Press and hold Output 1 and Output 3 simultaneously	Front Panel:	Press and hold Output 1 and Output 2 simultaneously

# 10 Kramer Protocol 2000

The Kramer Protocol 2000 for RS-232/RS-485 communication uses four bytes of information as defined below. All the values in the table are decimal, unless otherwise stated.

Kramer Protocol 2000 Structure							
MSB		LSB					
DESTINATION		INSTRUCTION					
0	D	N5	N4	N3	N2	N1	N0
7	6	5	4	3	2	1	0
1st byte							
INPUT							
1	I6	I5	I4	I3	I2	I1	I0
7	6	5	4	3	2	1	0
2nd byte							
OUTPUT							
1	O6	O5	O4	O3	O2	O1	O0
7	6	5	4	3	2	1	0
3rd byte							
MACHINE NUMBER							
1	OVR	X	M4	M3	M2	M1	M0
7	6	5	4	3	2	1	0
4th byte							

1st BYTE: Bit 7 – Defined as 0.

D – “DESTINATION”: 0 - for sending information to the switchers (from the PC);

1 - for sending to the PC (from the switcher).

N5...N0 – “INSTRUCTION”

The function that is to be performed by the switcher(s) is defined by the INSTRUCTION (6 bits). Similarly, if a function is performed via the machine's keyboard, then these bits are set with the INSTRUCTION NO., which was performed. The instruction codes are defined according to the table below (INSTRUCTION NO. is the value to be set for N5...N0).

2nd BYTE: Bit 7 – Defined as 1.

I6...I0 – “INPUT”.

When switching (ie. instruction codes 1 and 2), the INPUT (7 bits) is set as the input number which is to be switched. Similarly, if switching is done via the machine's front-panel, then these bits are set with the INPUT NUMBER which was switched. For other operations, these bits are defined according to the table.

3rd BYTE: Bit 7 – Defined as 1.  
O6...O0 – “OUTPUT”.

When switching (ie. instruction codes 1 and 2), the OUTPUT (7 bits) is set as the output number which is to be switched. Similarly, if switching is done via the machine's front-panel, then these bits are set with the OUTPUT NUMBER which was switched. For other operations, these bits are defined according to the table.

4th BYTE: Bit 7 – Defined as 1.  
Bit 5 – Don't care.  
OVR – Machine number override.  
M4...M0 – MACHINE NUMBER.

Used to address machines in a system via their machine numbers. When several machines are controlled from a single serial port, they are usually configured together with each machine having an individual machine number. If the OVR bit is set, then all machine numbers accept (implement) the command, and the addressed machine replies. For a single machine controlled via the serial port, always set M4...M0 = 1, and make sure that the machine itself is configured as MACHINE NUMBER = 1.

Instruction Codes for Protocol 2000				
Instruction		Definition for Specific Instruction		Notes
#	Description	Input	Output	
1	SWITCH VIDEO	Set equal to video input which is to be switched (0 = disconnect)	Set equal to video output which is to be switched (0 = to all the outputs)	2, 15
5	REQUEST STATUS OF A VIDEO OUTPUT	Set as SETUP #	Equal to output number whose status is reqd	4, 3
56	CHANGE TO ASCII	0	SVS protocol Generic protocol Protocol-3000	19
61	IDENTIFY MACHINE	1 - video machine name 2 - audio machine name 3 - video software version 4 - audio software version 5 - RS422 controller name 6 - RS422 controller version 7 - remote control name 8 - remote software version 9 - Protocol 2000 revision	0 - Request first 4 digits 1 - Request first suffix 2 - Request second suffix 3 - Request third suffix 10 - Request first prefix 11 - Request second prefix 12 - Request third prefix	13
62	DEFINE MACHINE	1 - number of inputs 2 - number of outputs 3 - number of setups	1 - for video 2 - for audio 3 - for SDI 4 - for remote panel 5 - for RS-422 controller	14

NOTES on the above table:

**NOTE 2** - These are bi-directional definitions. That is, if the switcher receives the code, it performs the instruction; and if the instruction is performed (due to a keystroke operation on the front panel), then these codes are sent. For example, if the HEX code

01            85            88            83

was sent from the PC, then the switcher (machine 3) switches input 5 to output 8. If the user switched input 1 to output 7 via the front panel keypad, then the switcher sends HEX codes:

41            81            87            83

to the PC.

When the PC sends one of the commands in this group to the switcher, then, if the instruction is valid, the switcher replies by sending to the PC the same four bytes that it was sent (except for the first byte, where the DESTINATION bit is set high).

**NOTE 3** - SETUP # 0 is the present setting. SETUP # 1 and higher are the settings saved in the switcher's memory, (i.e. those used for Store and Recall).

**NOTE 4** - The reply to a "REQUEST" instruction is as follows: the same instruction and INPUT codes as were sent are returned, and the OUTPUT is assigned the value of the requested parameter. The replies to instructions 7 and 11 are as per the definitions in instructions 7 and 8 respectively. For example, if the present status of machine number 5 is breakaway setting, then the reply to the HEX code

0B            80            80            85  
would be HEX codes  
4B            80            81            85

**NOTE 13** - This is a request to identify the switcher/s in the system. If the OUTPUT is set as 0, and the INPUT is set as 1, 2, 5 or 7, the machine sends its name. The reply is the decimal value of the INPUT and OUTPUT. For example, for a 2216, the reply to the request to send the audio machine name would be (HEX codes):

7D            96            90            81 (i.e. 128dec+ 22dec for 2nd byte, and 128dec+ 16dec for 3rd byte).

If the request for identification is sent with the INPUT set as 3 or 4, the appropriate machine sends its software version number. Again, the reply would be the decimal value of the INPUT and OUTPUT - the INPUT representing the number in front of the decimal point, and the OUTPUT representing the number after it. For example, for version 3.5, the reply to the request to send the version number would be (HEX codes):

7D            83            85            81 (i.e. 128dec+ 3dec for 2nd byte, 128dec+ 5dec for 3rd byte).

If the OUTPUT is set as 1, then the ASCII coding of the lettering following the machine's name is sent. For example, for the VS-7588YC, the reply to the request to send the first suffix would be (HEX codes):

7D            D9            C3            81 (i.e. 128dec+ ASCII for "Y"; 128dec+ ASCII for "C").

**NOTE 14** - The number of inputs and outputs refers to the specific machine which is being addressed, not to the system. For example, if six 16X16 matrices are configured to make a 48X32 system (48 inputs, 32 outputs), the reply to the HEX code

3E            82            81            82 (i.e. request the number of outputs)  
would be HEX codes  
7E            82            90            82  
ie. 16 outputs

**NOTE 15** - When the OVR bit (4th byte) is set, then the "video" commands have universal meaning. For example, instruction 1 (SWITCH VIDEO) causes all units (including audio, data, etc.) to switch. Similarly, if a machine is in "FOLLOW" mode, it performs any "video" instruction.

**NOTE 19** - After this instruction is sent, the unit will respond to the ASCII command set defined by the OUTPUT byte. The ASCII command to operate with the HEX command set must be sent in order to return to working with HEX codes.

# 11 Protocol 3000

The **VS-401USB** can be operated using serial commands from a PC, remote controller or touch screen using the Kramer Protocol 3000.

This section describes:

- Kramer Protocol 3000 syntax (see [Section 11.1](#))
- Kramer Protocol 3000 commands (see [Section 11.2](#))

## 11.1 Kramer Protocol 3000 Syntax

### 11.1.1 Host Message Format

Start	Address (optional)	Body	Delimiter
#	Destination_id@	Message	CR

#### 11.1.1.1 Simple Command

Command string with only one command without addressing:

Start	Body	Delimiter
#	Command SP Parameter_1,Parameter_2,...	CR

#### 11.1.1.2 Command String

Formal syntax with commands concatenation and addressing:

Start	Address	Body	Delimiter
#	Destination_id@	Command_1 Parameter1_1,Parameter1_2... Command_2 Parameter2_1,Parameter2_2,... Command_3 Parameter3_1,Parameter3_2,...	CR

#### 11.1.2 Device Message Format

Start	Address (optional)	Body	delimiter
~	Sender_id@	Message	CR LF

#### 11.1.2.1 Device Long Response

Echoing command:

Start	Address (optional)	Body	Delimiter
~	Sender_id@	Command SP [Param1 ,Param2 ...] result	CR LF

CR = Carriage return (ASCII 13 = 0x0D)

LF = Line feed (ASCII 10 = 0x0A)

SP = Space (ASCII 32 = 0x20)

### 11.1.3 Command Terms

#### Command

A sequence of ASCII letters ('A'-'Z', 'a'-'z' and '-').

Command and parameters must be separated by at least one space.

#### Parameters

A sequence of alphanumeric ASCII characters ('0'-'9', 'A'-'Z', 'a'-'z' and some special characters for specific commands). Parameters are separated by commas.

#### Message string

Every command entered as part of a message string begins with a **message starting character** and ends with a **message closing character**.

**Note:** A string can contain more than one command. Commands are separated by a pipe ( '|') character.

#### Message starting character

'#' – For host command/query

'~' – For device response

#### Device address (Optional, for K-NET)

K-NET Device ID followed by '@'

#### Query sign

'?' follows some commands to define a query request.

#### Message closing character

**CR** – For host messages; carriage return (ASCII 13)

**CRLF** – For device messages; carriage return (ASCII 13) + line-feed (ASCII 10)

#### Command chain separator character

When a message string contains more than one command, a pipe ( '|') character separates each command.

Spaces between parameters or command terms are ignored.

#### 11.1.4 Entering Commands

You can directly enter all commands using a terminal with ASCII communications software, such as HyperTerminal, Hercules, etc. Connect the terminal to the serial or Ethernet port on the Kramer device. To enter **CR** press the Enter key. (**LF** is also sent but is ignored by command parser).

For commands sent from some non-Kramer controllers like Crestron, some characters require special coding (such as, **/X##**). Refer to the controller manual.

#### 11.1.5 Command Forms

Some commands have short name syntax in addition to long name syntax to allow faster typing. The response is always in long syntax.

#### 11.1.6 Chaining Commands

Multiple commands can be chained in the same string. Each command is delimited by a pipe character (“|”). When chaining commands, enter the **message starting character** and the **message closing character** only once, at the beginning of the string and at the end.

Commands in the string do not execute until the closing character is entered.

A separate response is sent for every command in the chain.

#### 11.1.7 Maximum String Length

64 characters

## 11.2 Kramer Protocol 3000 Commands

Command	Short Form	Description	Permission
#		Protocol handshaking	End User
BAUD		Set protocol serial ports baud rate	Common
BAUD?		Get protocol serial ports baud rate	Common
BUILD-DATE?		Read device build date	End User
FACTORY		Reset to factory default configuration	Administrator
HELP		List of commands	End User
LDFW		Load new firmware file	Administrator
MACH-NUM		Set machine number	End User
MODEL?		Read device model	End User
NAME		Set machine (DNS) name	Administrator
NAME?		Get machine (DNS) name	End User
NAME-RST		Reset machine (DNS) name to factory default	Administrator
P2000		Switch to protocol 2000	End User
PASS		Set password	Administrator
PASS?		Get password	Administrator
PROT-VER?		Read device protocol version	End User
RESET		Reset device	Administrator
ROUTE		Set input	End User
ROUTE?		Get input	End User
SECURE		Start/Stop security	Administrator
SECURE?		Get current security state	Administrator
SN?		Read device serial number	End User
UPGRADE		Set device flag of new firmware	Administrator

## LIMITED WARRANTY

The warranty obligations of Kramer Electronics for this product are limited to the terms set forth below:

### What is Covered

This limited warranty covers defects in materials and workmanship in this product.

### What is Not Covered

This limited warranty does not cover any damage, deterioration or malfunction resulting from any alteration, modification, improper or unreasonable use or maintenance, misuse, abuse, accident, neglect, exposure to excess moisture, fire, improper packing and shipping (such claims must be presented to the carrier), lightning, power surges, or other acts of nature. This limited warranty does not cover any damage, deterioration or malfunction resulting from the installation or removal of this product from any installation, any unauthorized tampering with this product, any repairs attempted by anyone unauthorized by Kramer Electronics to make such repairs, or any other cause which does not relate directly to a defect in materials and/or workmanship of this product. This limited warranty does not cover cartons, equipment enclosures, cables or accessories used in conjunction with this product.

Without limiting any other exclusion herein, Kramer Electronics does not warrant that the product covered hereby, including, without limitation, the technology and/or integrated circuit(s) included in the product, will not become obsolete or that such items are or will remain compatible with any other product or technology with which the product may be used.

### How Long Does this Coverage Last

Seven years as of this printing; please check our Web site for the most current and accurate warranty information.

### Who is Covered

Only the original purchaser of this product is covered under this limited warranty. This limited warranty is not transferable to subsequent purchasers or owners of this product.

### What Kramer Electronics will do

Kramer Electronics will, at its sole option, provide one of the following three remedies to whatever extent it shall deem necessary to satisfy a proper claim under this limited warranty:

1. Elect to repair or facilitate the repair of any defective parts within a reasonable period of time, free of any charge for the necessary parts and labor to complete the repair and restore this product to its proper operating condition. Kramer Electronics will also pay the shipping costs necessary to return this product once the repair is complete.
2. Replace this product with a direct replacement or with a similar product deemed by Kramer Electronics to perform substantially the same function as the original product.
3. Issue a refund of the original purchase price less depreciation to be determined based on the age of the product at the time remedy is sought under this limited warranty.

### What Kramer Electronics will not do Under This Limited Warranty

If this product is returned to Kramer Electronics or the authorized dealer from which it was purchased or any other party authorized to repair Kramer Electronics products, this product must be insured during shipment, with the insurance and shipping charges prepaid by you. If this product is returned uninsured, you assume all risks of loss or damage during shipment. Kramer Electronics will not be responsible for any costs related to the removal or re-installation of this product from or into any installation. Kramer Electronics will not be responsible for any costs related to any setting up this product, any adjustment of user controls or any programming required for a specific installation of this product.

### How to Obtain a Remedy under this Limited Warranty

To obtain a remedy under this limited warranty, you must contact either the authorized Kramer Electronics reseller from whom you purchased this product or the Kramer Electronics office nearest you. For a list of authorized Kramer Electronics resellers and/or Kramer Electronics authorized service providers, please visit our web site at [www.kramerelectronics.com](http://www.kramerelectronics.com) or contact the Kramer Electronics office nearest you.

In order to pursue any remedy under this limited warranty, you must possess an original, dated receipt as proof of purchase from an authorized Kramer Electronics reseller. If this product is returned under this limited warranty, a return authorization number, obtained from Kramer Electronics, will be required. You may also be directed to an authorized reseller or a person authorized by Kramer Electronics to repair the product.

If it is decided that this product should be returned directly to Kramer Electronics, this product should be properly packed, preferably in the original carton, for shipping. Cartons not bearing a return authorization number will be refused.

### Limitation on Liability

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CE



**SAFETY WARNING**

Disconnect the unit from the power supply before opening and servicing



P/N: 2900-300029



Rev: 1